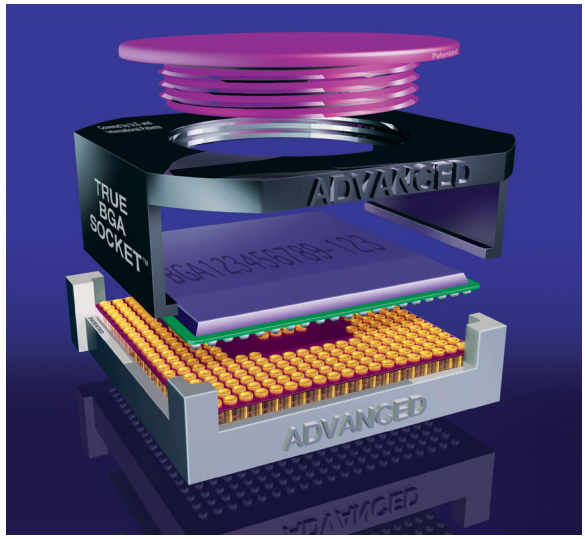
Test, Production, and Field Repair of BGA-Mounted Integrated Circuits Facilitated by Advanced Interconnections' Test Sockets

THE CHALLENGE

Integrated circuits (ICs), sealed in ball grid array (BGA) packages, must frequently be subjected to electronic testing throughout the product life cycle, including design, development, emulation, production, programming, and, finally, deployment as part of a complete system.

However, testing ICs in BGA packages can often pose a challenge for IC manufacturers, OEMs, and end users alike. For example, suppose that the BGA package is soldered directly to either a test or production printed circuit board (PCB) and then subjected to IC testing. To remove the BGA after testing, it must first be desoldered. Then, presuming the IC is still usable, the BGA must be reballed before mounting again. This adds time and labor, while posing the risk of thermal or mechanical damage to an expensive IC or motherboard.

One way to alleviate this problem has been to use a socketing system, in which an array of socket terminals is permanently soldered to the PCB, and the BGA is soldered to an adapter designed to plug into the sockets. This arrangement facilitates the installation and removal of the BGA without risk of damage. If the same socket system is used on the test fixtures as on the production PCBs, transferring the BGA between testing and operational environments is intuitively simple, taking only seconds.



Our patented True BGA Socket™ facilitates test, development, production, and field repair of BGA and LGA devices.

The socketed approach offers an obvious advantage when mounting BGA packages for test, production, and repair purposes. By utilizing a socket with the same footprint and size as the device package, test board layouts can easily be converted to production boards without the need for costly redesign. This eliminates the need to develop a special PCB to accommodate a unique footprint or large test socket.

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ADVANCED INTERCONNECTIONS

Advanced Interconnections Corp. ▪ 5 Energy Way ▪ West Warwick, Rhode Island U.S.A.
Tel: (800) 424-9850 ▪ (401) 823-5200 ▪ FAX: (401) 823-8723
E-mail: info@advintcorp.com ▪ Web Site: http://www.advintcorp.com

THE ADVANCED® SOLUTION

As an alternative to soldering BGA packages directly to a PCB, Advanced Interconnections' BGA socketing systems offer dependable, field-proven attachment methods that facilitate device upgrade, replacement, repair, testing and emulation. Moreover, electrical properties are excellent, having been tested at frequencies up to 6GHz with less than a 3dB signal loss.

Unlike many other commercially available socketing systems, the Advanced Interconnections solution is available with footprints that match the sizes of the BGA packages being mounted and with a choice of pitches down to 0.75 mm. Since there is no requirement for additional space on the PCB to accommodate the socket, it is unnecessary to redesign the PCB when converting the BGA test and board assembly process from direct mounting to socket mounting.

The Advanced Interconnections True BGA Socket™ design (pictured on page 1) represents a unique evolution of the standard BGA socketing system as it facilitates testing while altogether eliminating the need to solder the BGA to the adapter. Instead, only the True BGA Socket is soldered to the board. Then the BGA package is placed on top of the socket, covered by a support plate, and secured by first sliding a clamp in place over the BGA and then tightening a coin screw or finned heat sink (see Fig. 1). Optimal electrical continuity is assured by the use of spring-loaded beryllium copper contacts in pogo pin terminals, the heads of which are compressed against the balls of the BGA package. True BGA Socket is available in 1.27mm and 1 mm pitch, and a choice of footprints that match the BGA packages being mounted.

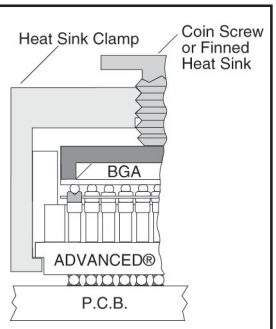
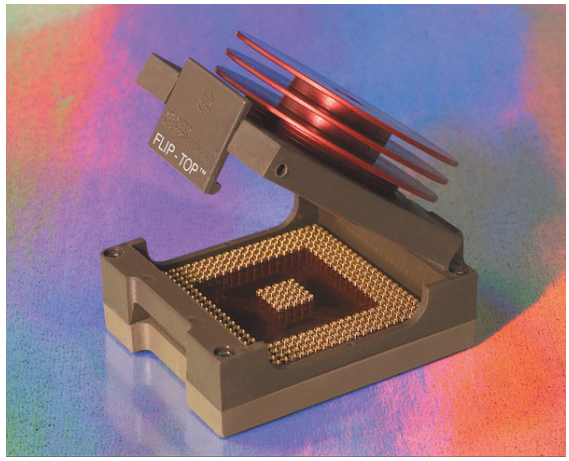


Fig. 1 – Sliding heat sink assembly functions as clamp to engage device to socket connection.



The Flip-Top™ BGA Socket is designed to reduce clearance space needed on the PC board. This socket is only 3mm wider and 10mm longer than the BGA device package.

For PC boards with limited space, AIC's Flip-Top™ BGA Socket utilizes an open-top design with no additional clearance area required for sliding the heat sink assembly. The Flip-Top BGA Socket is available in 1.27mm pitch with either SMT or thru-hole terminals. Both the True BGA Socket and the Flip-Top BGA Socket designs are also ideal solutions for use with field programmable BGAs, and for testing BGAs and LGAs (Land Grid Arrays) from which the solder balls have been removed.

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